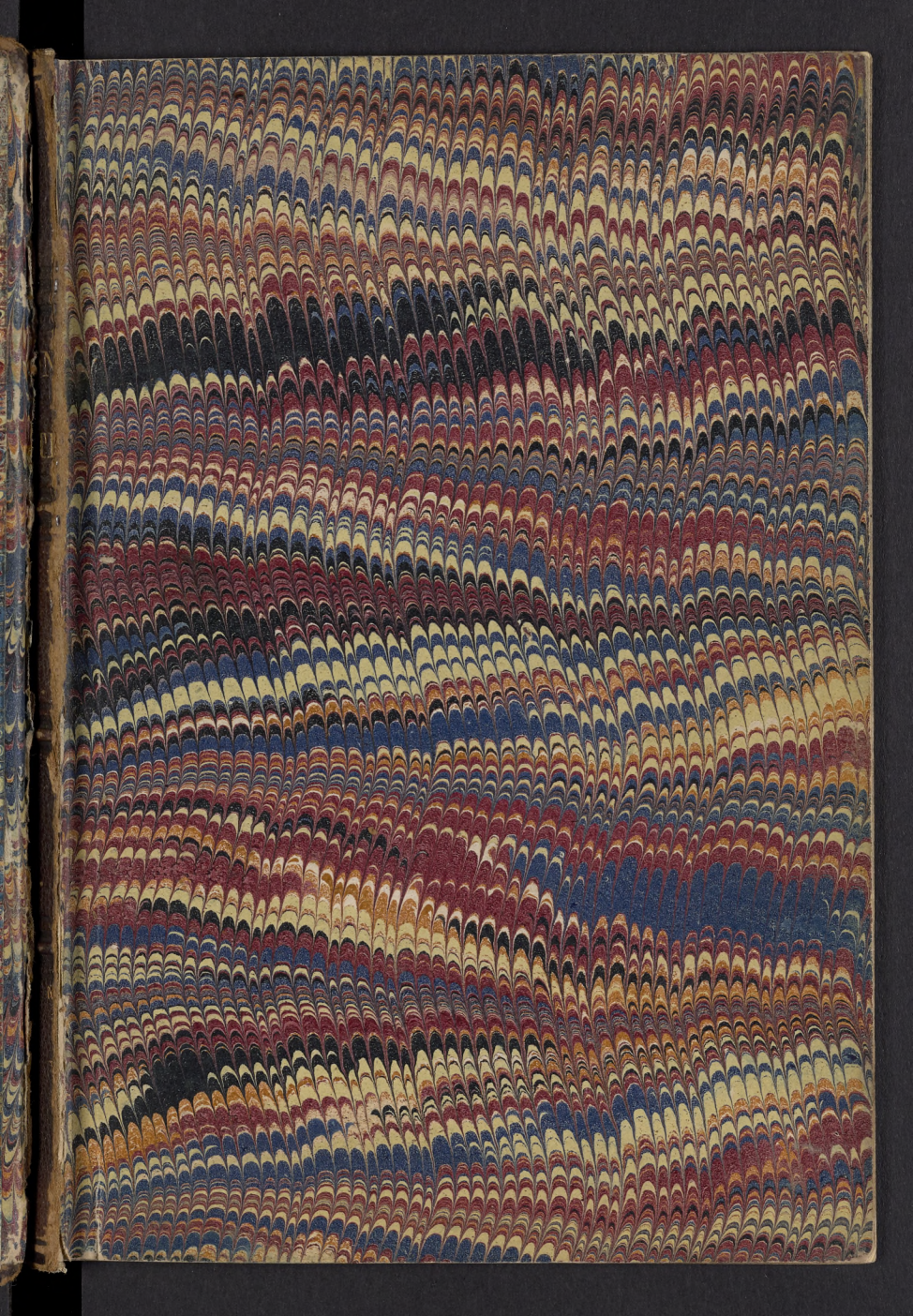
Dr. Herbert M. Howe.



227653 Mrs. Alfred G.B. Steel & her 3 sisters
through the auspices of Dr Halsey DeWolf

Notes taken upon Lectures
delivered by
Professor F. G. Smith.
on the Institutes of Med.

W. M. Howe

Oct. 12th. 64. Lecture no 1.

There are several branches of Physiology - known serially as General Physiology - Vegetable Physiology Comparative Physiology - Special Physiology and Human Physiology the last of which shall be our especial study - By Organic matter we understand such bodies as are provided with organs fitted to carry out particular ends in the economy - Inorganic matter is not provided with any of these organs - First we observe that organic substances spring from a parent - Spontaneous generation then, is not tenable - but Harvey's motto is the correct one - "Omne vivum ex ovo" - The duration of an organic body is definite

it has its time to be born - its time to live and its time to die. The shape of organic substances is rounded - the inorganic body, on the other hand is usually angular - The organized being also grows by internal by internal de-posit - The supplies making up for waste and decay are introduced through the in-ternal organs in the form of food. The size is definite-regulated by the laws govern-ing the genus or race to which the organized body belongs - The moment we begin to live that moment we begin to die - for every effort made whet-er of thought or of motion caus-es a waste - Inorganic bodies

Oct 14th 63.

Lecture no 1 –

Distinctions between Organic and Inorganic Bodies –

Organic	Inorganic.
From a Parent	Has no Parent
Duration Definite	Duration Indefinite
Shape Rounded	Angular in Form
Grows by internal deposit	Accretion
Size determinative	Size Indeterminate
Variable	Constant
Tendency to Decomposition	No such Tendency –
Binary or Quaternary	Generally simple or binary
Heterogeneous in structure	Homogeneous –
Soft or Elastic	Hard and solid
Can be decomposed but not recomposed	Can be decomposed & recomposed –
Have power of conservation and reproduction	Can do neither.
Can appropriate and assimilate	

Chemical constituents of Organic Matter -

Oxygen
Hydrogen
Nitrogen
Carbon
} Essential -

Sulphur - in hair, albumen and brain.
Phosphorus - in bone, teeth and brain.

Chlorine
Fluorine
Potassium
Sodium
Calcium
Magnesium
} In teeth bones & muscles -

Manganese
Silicon
} In the Hair -

Iron - in the Blood -

Iodine
Bromine
} In some marine animals -

Aluminium
Copper

on the other hand so far as their own action goes remain unchanged. In the organic body we have what are known as Essential elements. These are Oxygen, hydrogen, nitrogen & carbon. These are found in all organic bodies. Inorganic substances on the contrary are more simple. Elasticity is another property of Organic bodies. this is due to the quantity of water contained in them. Organic substances can be decomposed but not recomposed. we may find out the exact constituents and quantity of each, entering into Albumen or Casein, but by combining them however accurately we cannot re produce the Albumen or Casein

Minerals do not feed they simply exist - they have no life, no re-production - no death. Vital phenomena are unlike the laws which are found ruling Inorganic bodies. Organic life comes either under the head of the Vegetable or the Animal Kingdom. In the higher organisms there is no difficulty in distinguishing to which class and body may belong - but the boundary line can hardly be drawn with great accuracy in every instance. Motion and the possession of a stomach were at one time supposed to be characteristics of animals alone - but this is no reliable. If we find an organic body feeding on inorganic matter and exhaling oxygen and absorbing

Functions of Organized Bodies.

Generation Digestion Absorption Respiration Circulation Nutrition Secretion Calorification	Organic or Vegetative.
Sensation Voluntary motion. Mental and moral manifestations	Functions of relative or animality.

Assimilation !! animality

Lecture no 2.

Fluids enter much the most into animal construction forming indeed 2/3 of the animal structure. Fluids are also the most important. The fundamental construction of an organized body consists of a Cell

The ovum in the mother divides in the middle each one half forming a new cell. These again divide and subdivide each division forming a new cell. Then by the influence of the mother form some muscular tissue and some bone tissue, and so on all the tissues entering into the animal economy.

Manifestations of cell life.

Growth of the original cell from its germ to its maturity involving the selection and appropriation of its materials.

Multiplication by subdivision either of the original cell or of its nucleus.

Chemical transformation exerted upon the protoplasm of the cell, whereby new products may be generated

carbonic acid gas - we may place it as belonging to the vegitable kingdom - if not - it belongs to the animal -

Lecture no 2.

Classification of Tissues -

ultimate physical elements of organized bodies - Primary physical forms of organized bodies -

Organic cell -

Secondary Physical Elements

Tissues -

I. Cells isolated or free corpuscular tissues -

II Cells aggregated or in laminae -

1 Adipose tissue

2 Epithelial "

a. Mucous

b. Serous -

c. Epidermic -

3. Glandular tissues

4. Ganglionic tissues
5. Pigment
6. Anonymous tissues as spleen &c.
III. Cells with parietes blended and contents removed.
Structureless membrane
a. Basement.
b. Capsular.
IV. Cells with parietes with an intercellular substance.
1. Cartilage tissue.
2. Osseous "
V. Cells forming tubes with solid or fluid contents.
1. Capillary tissue
2. Muscular "
3. Nerve fibres
4. Dentine
VI. Cells converted into a filamentous substance
1. White fibrous tissue

in its interior.

Vitalization of a portion of the pabulum whereby it becomes endowed with vital properties of its own, so as even to originate cells - de novo -

Temporary ~~[illegible]~~ changes of form applied to the generation of mechanical force and to the production of sensible motions.

Permanent changes of form taking place in connection with acts of growth and giving a peculiar character to the tissue.

Production of nervous force which may affect all the preceding operations & which is internally related to mental agency -

Lecture No. 3.

A "Proximate Principle" is one that exists in the solid or fluid of the body and can be extracted from either

without changing their character.

Proximate Principles of Tissues and Fluids.

1st. Class. Inorganic, Chrystallizable and derived from the exterior. Water, Chloride of Sodium (in all) Chloride of Potassium (in muscles, blood, milk, urine) Phosphate of Lime (in every tissue and in every fluid.) Carbonate of Lime (in bone) Carbonate of Soda (in blood, chyle, lymph & urine) Carbonate of Potassa (in blood, chyle &c) Phosphate of Magnesia, Soda and Potash (in the various solids and fluids.

2nd. Class. Organic, Chrystallizable and formed in the interior.

Starch, Sugar and Fats.

3rd. Class. Organic Substances proper.

Albumen
Fibrin
Casein } Proteinaceous.

2 Yellow Elastic

VII. Cells converted into a prismatic column.

1. Enamel tissue.

2. Crystalline.

VIII. Cells converted into a corneous substance.

1. Pilous tissue

2 Corneous.

Schleiden and Schwann believed that cells had their origin in a structureless liquid. The name given to the process which they advocated is "free cell development." Their theory has been however set aside by the light of more recent investigations. The chief argument against the reception of their belief is that it presupposes the possibility of spontaneous

generation - which is now regarded as untenable -

Schwann's idea of cell development appears in Lecture No 3 - as the Exogenous development - Endogenous development is the name given to that process in which cells are created in the interior of preexisting cells -

Lecture No 3 -

In the connective tissue we find germinative nuclei placed. From this is formed a cell the nucleus of this cell divides and redivides making a progeny of cells ready for repair - The reproductive tissue assists the surrounding tissue

Globuline, Pepsine, Pancreatine, Pyine, Mucosine, Osteine, Cartilagine, Musculine, Haematine, Melanine, Bilirudine, Urosacine.

Physical Properties of Tissues

Elasticity. Flexibility, Extensibility & Endosmose.

Lecture no. 4.

Vital Properties

Formative force { Development, Growth, Assimilation

Contractility

Power of conducting and transmitting impressions.

Endosmotic and exosmotic action takes place much more readily through organic than inorganic septum. Decomposition assists endosmotic & exosmotic action. Absorption takes place much more quickly if there is a lack of blood. Fluids are not

the only articles that are subject to the action of endosmose and exosmose - but gases are also transmitted - Plants also carry on these two actions as in animals - Nicotina if swallowed does not poison in the least - the explanation of this, is that it stops the endosmotic action - but should some of the contents of the stomach of an animal that had had this poison introduced into it, be injected into the circulation of another animal it will act almost immediately as a rank and deadly poison.

Lecture no 5.

Essential conditions of life.

1st. A germ or nucleus, endowed with life, & derived only from a parent

II nd. The constant presence of food or plasma in contact with the germ.

III rd. A definite amount of water.
IV th. Oxygen in the proportion of the atmosphere.
V th. Caloric, in definite quantity but varying for different genera.

The life of a cell is merely as its activity. Thus the more active the life of a cell is the shorter is that life. It is evident then, that constant death is going on in animals. In fact it is by virtue of this very death that life exists. By contractility is meant that power which animal tissues possess, of moving on the application of an irritant. This power resides in the cells and (~~the~~) totally independent of nerve action. The abstraction of any one of the "Essential conditions of Life" destroys life, and the modification, of any one of these, causes disease. Then

are two kinds of germs - 1st the "Ova Germ" 2nd the "Tissue Germ" - The fecundation of the male, is in every instance necessary to the formation of a new vital organism. The impression of the first connection with the female often lasts in her and shows itself in future offspring. Thus a widow on a second marriage, often bears children resembling her former husband, they sometimes inherit diseases which their own father is perfectly free from - but the former husband had - thus Tuberculosis & Syphilis. Food is necessary to life - Imperfect food will cause disease - for the cells will then be but poorly nourished -

this it does from a kind of type power exerted upon the cells by the cells of the tissue.

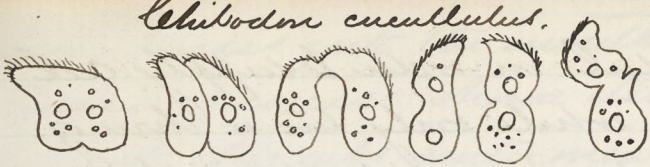
Lecture No 4.

Crystaloids will diffuse away from colloids. this action is known as dialysis. Endosmose and exosmose are facilitated by moving the membrane. Temperature also has its influence high temperatures hasten the action. Both fluids are mixed with each other no endosmotic action will take place. neither can this process take place if the substances are chemically manipulated with each other. certain nervous influences will prevent endosmosis.

Lecture No 5 -

Physical forces can be changed the one into the other. The electricity can be changed into magnetism and vice versa. Motion may be changed into heat. Vital forces can also be converted the one into the other. By formative force we mean that ability which gives and after the germ the living being has of making itself from dissimilar substances. We may have development without growth we may also have growth without development. As an illustration of the latter we have the heart. It is first a sack. This sack

Chilodon cucullulus.



If secretions intended to be thrown off the system remain in it, it will cause disease - thus if urine is retained urea will enter the blood and cause disease -
There is an article, Ozone found in the atmosphere - it is found in larger quantities after thunderstorms - the word is derived from a Greek word meaning "to stink." It is a very strong oxidizing agent. It is supposed to influence or cause the Influenza epidemic - the absence of it is supposed to cause epidemic Cholera - "When an animal starves it is not so much from the want of food, as from the falling of temperature -

Lecture no 7

Eight or nine ounces of solid carbon, are used every day in a single in-

dividual in order to supply calorie - while only two or three g. of heat are supplied in the food in order to meet the "wear and tear" of the system. The illustration of the Chilodon Cucullulus is an instance of an animal which carries on Fissiparous reproduction. The parent splits, and each part forms a new animal. In the first three drawings the animal divides longitudinally, in the last three the animal is shown splitting transversely.

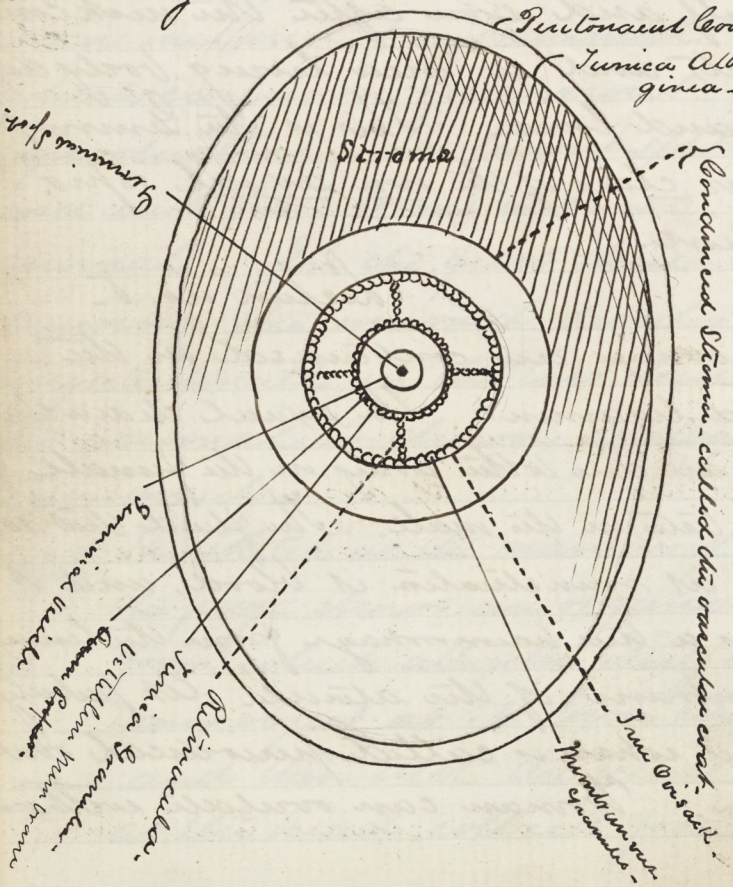
The sketch at the margin of the page shows an organic form which attaches itself to any object, at its lower end, and then with the feelers at the head, collects food

which passes into the mouth. after a time, a process shows itself on the trunk, this gets nutriment from the parent for some time - but at length, pulses grow out of the head of this process, and gathers food for itself, and soon after the neck contracts and a new living body drops off and lives. This is the Gemmiparous class of the non sexual reproduction.

Lecture no. 8.

The ovaries are contained in the broad ligament. The sexual characteristics are due to the ovary in the female, & to the testes, in the male. The fluid that escapes at menstruation is blood, and it forms a true haemorrhage from the lining membrane of the uterus. At puberty there is what is called "periodical ovulation". Woman can ovulate without

menstruating. They can also men-
struate without ovulating. Ovul-
ation is not the cause of menstru-
ation. Menstruation takes place
in order to prepare the uterus for the
new being.



divides into two from that into three once from that into four. now it may stop its development at any one of these stages - but yet it grows.

Lecture 6

By reproduction we mean that means whereby the existence of a species is prolonged. Non sexual reproduction may either be Fissiparous or Gemmiparous. In the Fissiparous variety the parent splits & each piece makes an independent being. In the Gemmiparous. there is a budding - the buds develop and at last the offspring from the parent cut off by an indefinite life. In the non sex

ual variety the whole function is carried on by one parent or by one set of organs.
In the sexual variety of reproduction the whole function is carried on in both animals or two sets of organs. There are two varieties of this sort of reproduction. The animals having both sets of organs upon one body is called Hermaphrodite. Those in which both set of organs are on the others on the other are called Diocious. Evolutionists suppose that all the malcals are provided by one of the parents. Epigenesis suppose that some ~~in that set of~~ ~~reproduction~~ by the malcals are provided by both.

About the time of menstruation the Graffian Follicle rises in the stroma contained in the ovarium. It at last puts the Peritoneal coat and Tunica albuginea on the stretch. at last it bursts the two coats, and is free, after that the Germinal vesicle bursts and allows the exit of the Germinal spot. This germinal spot will always have the upper most place in the Graffian Follicle, nearest to the Peritoneal coat, so that the Spermatozoa have but little way to travel, in order to meet this germinal spot. The corpus luteum of pregnancy is larger than the corpus luteum of menstruation. The corpora lutea of menstruation lasts about 3 months. the corpora lutea of pregnancy lasts for more than 9 months.

<u>Conclusions in regard to the Ovular</u>

Reproduction -

- Non sexual
  - Fissiparous
    - Parent splits. each part a new animal
    - 1 Transverse as in the Hydra viridis (polype)
    - 2 Longitudinal, as in some Vorticellae (infusory)
    - 3 Irregular, as in Gonium pectorale (infusory)
  - Gemmiparous
    - Parent splits & discharges the young as in the Volvox Globatus -
    - Budding upon the parent stalk as in the Hydra viridis
    - Separation buds. Gemmae or Sporules
    - 1. On all parts of the body as in Actinia & Medusae -
    - 2. On one part, organ only as in the Aphrodite -
- Sexual
  - Hermaphrodite
    - Both sexual organs on one individual
    - 1 Self
    - 2 Mutual
    - Impregnated
      - as in Holothuroidea
      - as in Earthworm -

Lecture No 5 -

Arguments against Spontaneous Generation - The sperm is an albuminoid fluid - The spermatozoa have been seen to move 4 or 5 days after their introduction into the vagina. One spermatozoon is made within what is called a "vesicle of evolution". Sometimes in the Entozoa the sperm-atozoa of the male enters the female when within their vesicle of evolution - they then develop within the female organs and after their full development they fecundate her egg. It is possible that the same thing may take place in the human female - If so this would prove

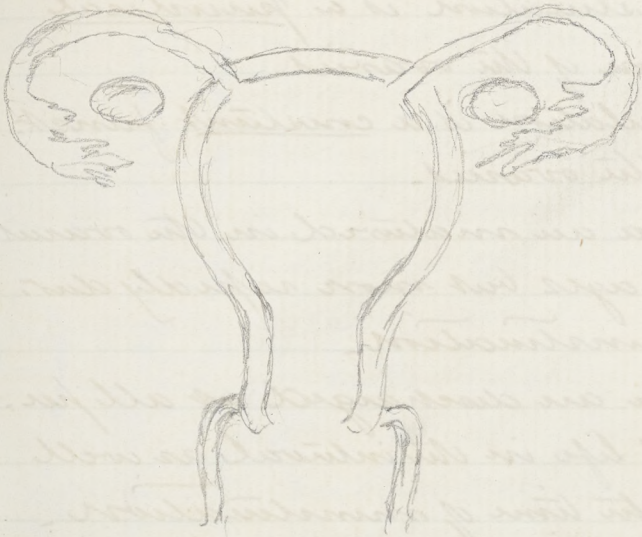
Lecture No 8.

If we can find instances of ovulation without menstruation or menstruation without ovulation we may have very reason to believe that the one is not caused by the other. Dr. Ritchie has examined women after death who died when menstruating but he could find no evidence of the recent opening of an egg. There are certainly many instances of ovulation without menstruation.

Lecture No 9.

Poor escape at all times some alleged to inflammation of a recent intercourse. As a wom

Boivin



Theory of Menstruation.

I. Menstruation is a periodical function of the ovaries.

II. Ovulation is a constant function of the ovaries.

III. Ova are matured in the ovaries at all ages but more rapidly during menstruation.

IV. Ova are discharged at all periods of life in the interval as well as at the time of menstruation.

V. Ovulations and menstruation being often concurrent, indicate that they are both the result of the attainment of a certain point in the development of the female economy.

VI. The law of periodicity in the one not obtaining in the other leaves still wanting the inseparable link in the chain of causation whereby menstru-

an may ovulate without menstruating, a woman may become pregnant who has never menstruated. Menstruation in the human female and Oestrum in the lower animals is somewhat analogous. Fecundation essentially consists in the mutual contact of the two organized cells formed in different bodies - the ovogerm and the spermgerm. Actual contact must take place. That this contact and therefore fecundation may take place in the way is proved by the accidents of human pregnancy. The small orifice of the entrance of the fallopian tube into the uterus to fall

er with the ovary & the cilia of the tubes from the ovary to the uterus and the peristaltic action of the Fallopian tubes are obstacles to contact taking place above the uterus. Fecundation and conception are organic vital acts. For this reason a woman can conceive without her knowledge and consent. The time has come and fake corporeal declared by Gyneco are incorrect. For all are true corporeal beliefs whether the egg be fecundated or not. Fecundation is the mutual action of the ovogerm and the spermogerm after meeting

ation can be shown to be the effect of ovulation.

VII. At the menstrual period, the ovaries experience an extension of uterine congestion, and become equally with the ovaries the seat of increased functional activity.

VIII. The menstrual flow is a true hemorrhage as shown by chemical analysis and by the phenomena of disease.

IX. Menstruation and the elimination of vesicles are equally functional phenomena of the ovaries, this action in the healthy non gravid or lactating woman sustaining a periodical exaltation of power which extends to the vascular, nervous & absorbing tissues of the ovaries, occasioning the maturation and discharge of vesicles, and to the uterus

and vagina giving rise to the extrusion of deciduous vessels & the mucus.

Lecture no 9.

Fecundation consists essentially in the mutual action of two organised bodies formed in two different cells. the sperm germ and the ovo germ.

Corpus Luteum of Menstruation

At the end of 3 weeks. Three quarters of an inch in diameter.

One month. Smaller. convoluted, wall bright yellow clot still reddish.

Six months Absent } Reduced to the condition of an insignificant cicatrix.

Nine months Absent } Two months

Corpus Luteum of Pregnancy

At the end of 3 weeks. Central clot red disk, convoluted wall pale.

One month. Larger: convoluted wall bright yellow: clot still reddish.

Conception is the connecting of the fecundated egg to the walls of the uterus -

Lecture No 10 -

Should the fecundated egg fall into the abdomen or should it remain in the ovary, still we find the development of the decidua membrane within the uterus - This seems to be caused by sympathy - When pueblo rabbits skip on generator and are discovered in the nest it is known as Attavism - Acquired properties may be inherited - very hunter knows that the progeny of good hunting dogs are more easily trained than those of uneducated dogs - Dog

nancy though generally
regular in duration, is
sometimes variable.
The French code regards a
child as legitimate born
300 days after the absence
or decease of the father.
Superfetation is the giving
of birth to another child
shortly after the birth of a
previous one

It has been contended that none of the
females is sterile.

After that until the 6th month. Seven eighths of an inch in diameter: convoluted wall bright yellow, clot perfectly decolorized.
Six months. Still as large as at the end of the second month. clot fibrinous. convoluted wall paler.
Nine months. One half an inch in diameter, central ~~fresh~~ clot converted into a radiating cicatrix, the external wall tolerably thick & convoluted, but without any bright yellow color.

Lecture no 10.

Fecundation does not usually take place in the ovary. as some suppose. It may happen but it is not likely. There are 3 reasons why this is not likely to take place. 1st. the thickness of the walls of the ovary 2nd. the peristaltical movement of the Fallopian

tube - which is from above downwards - 3rd - from the cilliated character of the mucous membrane of the Fallopian tubes - When the ovum attaches itself to the wall of the uterus it draws its nutritious aliment from the deciduous membrane - The decidua vera is an altered state of the lining membrane of the uterus -

Lecture no 11 -

The duration of Pregnancy is generally 280 days or 40 weeks. It is probable that no child in intra uterine existence lives until the seventh month - Malformation in the foetus is not due to any presentiment of the mother - There are a number of facts which would show

Any thing whether is be solid liquid or gaseous that can be employed as nutriment is food.

If an extra quantity of food be supplied to a vegetable it will grow to a greater size. If the quantity of food be not enough to build the wood and leaves the plant will be stunted. If we take some plants near the sea shore and we then give up

this - such - as that the malformation is rarely like what the mother thinks. it often happens in only one of twins, it sometimes occurs in internal organs which the woman would have no influence. A sudden fright may sever the connection between the mother and the foetus - Digestion - More than a ton weight of waste is made in a man in the course of a year - and consequently more than a ton of food must be taken every year in order to make up for this waste. The vegetable lives on inorganic & the animal on organic food.

Classification of Aliments.

Pereira -

Aqueous	Mucilaginous
Saccharine	Amylaceous -
Liquous -	Pectinaceous -
Acidulous	Alcoholic -

Oily or Fatty — Protinaceous
Gelatinous — Saline.

Magendie.

Farinaceous. — Mucilaginous.
Sweet. acid. — Oil or Fatty.
Caseous. — Gelatinous.
Albuminous. — Fibrous.

Liebig.

Nitrogenized or Plastic elements of nutrition.

Vegetable Albumen.
Vegetable Caseine.
Vegetable Fibrine
Animal flesh and Blood.

Non-nitrogenized Elements of Respiration

Fat — Pectine
Starch — Bassorine
Gum — Wine
Cane sugar — Beer
Grape sugar — Spirits.

into the woods we will see the same plant fully grown and developed — on the seashore due to the lack of food we have but a mere rudiment of the plant that grows to full perfection in the upland.

Alcohol is not only a food but it does a second good - for it prevents wasting. Tea and Coffee do the same. Salts help in the solubility of the food.

Those who die of starvation - die not so much from the lack of food - as of the abnormal decrease in temperature.

If Gelatin does good as diet it is by first undergoing decomposition.

If albuminous food be deficient - different diseases show themselves - one of which is Phthisis. Those who eat more Albuminous food than is perfectly healthy - have uremia in the blood - and

Sugar of milk.

Prout (modified)

Saccharine, Oleaginous, Albuminous, Aqueous, Gelatinous (?).

Accessory Diet.

Alcohol, Tea, Coffee, Salt, Spices, Tobacco, Opium, Indian Hemp, Flavoring Ethers. Essential Oils, Coca.

Lecture no. 12.

Waste makes a demand for food. food is also demanded for the generation of caloric. Gelatin is believed to be utterly useless as an article of food. an animal fed upon gelatinous food will soon refuse to eat it. If man eats more oleaginous food than can be consumed in the production of heat, or in the function of respiration, the liver will take upon itself augmented action, and an unusual quantity of Bile will be secreted.

Persons who eat too much Amylaceous food, are those who suffer with Rheumatism. The starch first changes into dextrin, then into grape sugar and at length into lactic acid, the presence of which in the blood is known to be the cause of rheumatism. The Synovial membranes of the joints, try to eliminate this acid from the blood, and this acid is exuded into the joints, and as it is irritating, it causes Rheumatism. Alcohol used in proper quantity is a valuable article of food, for it lessens the waste in the system. Thus it is useful for patients of feeble diet.

Lecture No. 13.

At the latter part of Lactation in the woman, the quantity of Casein

as a consequence suffer from
Arthritic affections. The stan-
dard ~~use~~ taking of water is found to
increase the urinary excretions.
If assimilation (digestion) be sufficient to
make up for this excretion the
~~high~~ large quantity of urine need
is unnecessary, but if it be not
it causes debilitation. Prac-
tical deductions may be made
from this. In the case of Hypo-
trophy and the like the ex-
cretion of water is useful.
In the opposite condition it is
is detrimental. Tobacco when
taken in moderate quantities
by those not given to its use
promotes urine, and causes
the secretion of saliva, and the
excretion on their salivary glands,
by reflex action causes the secret

ion of Gastric Juice.

The act of Mastication is a voluntary one. This action depends on the influence of the 5th pair and the 7th pair of nerves. General sensibility is also necessary to the act.

During digestion the saliva is alkaline. in the intestinal it is neutral.

in her milk is augmented as it draws near its close. The lips are prehensile organs in the herbivorous animals. Thus if the 5th pair of nerves be divided, in the ass it will be hungry and endeavor to eat oats placed before him, but will be unable to get them into the mouth. The carnivorous animals can only flex and extend the jaw. Imperfect mastication is a potent source of Dyspepsia. There are 6 glands that pour into the mouth 1st the Parotid. 2nd Maxillary. 3rd Lingual. The others are found in the tongue and tonsils. All of these glands are engaged in pouring out the compound substance called Saliva. This substance possesses a strong alkaline reaction. The specific gravity of this ranges from 1004 to 1008. About three pounds

of Saliva is thrown off in the healthy individual every day. Saliva changes Starch into Grape sugar. The secretion poured from the Parotid and sub lingual glands is thin and watery. That from the sub maxillary is thick. The sort of food eaten, influences the quantity of saliva thrown out. The Sub maxillary Gland pours out a glutinous liquid to lubricate the bolus before swallowed.

Composition of Saliva.

Water	988.10
Solid Matter	11.90
Ptyaline	1.80
Mucus & Epithelium	2.60
Fatty Matter	.30
Albumen with Soda	1.70
Sulpho-cyanide of Potassium	.90

The principal function the Salivary perform in Digestion is a physical and not a chemical one. It does however change Starch into grape sugar

Quantity of Saliva absorbed during Mastication.

For 100 parts of Hay was absorbed 406 parts
" " " " Barley meal " 186 "
" " " " Oats " 113 "
" " " " Green stalks " 469 "

The Saliva is chiefly useful in aiding deglutition which must be proved by an experiment which neither Sommerring performed or. Doubling Doctors cut with perfect impunity suffering the mouth almost to suffocation — now it is more on for this very

great flux of Salum. The
fever taken under wist
abby church in death.

Alkaline & Earthy Salts. 3.20
Loss - 1.20 -

Experiments on Amount of Saliva.

Before Regulation	After Reg.	Gain -
Hay - 75 grammes	1125	1050
Oats - 500 "	1250	750
Bran (dry) 375 "	750	375
Starch & Bran (mixed) } 375.	{ 725	350 nearly -
Bread 250 "	612	362 -

On the table (illustrating the lecture) were various kinds of skulls - and a model showing the position of the Parotid Gland.

Lecture No. 14

The 7th and the 5th pairs of nerves combined with fibres from the posterior root of the 5th, are the ones which carry on the function of mastication. Just before swallowing the bolus is collected on the back part of the tongue, the tongue is then pressed upon the

hard palate, it then moves back on the roof of the mouth, and pushes the food down the the half arches - this is voluntary & forms the first stage of deglutition - The pharynx then rises, & the tongue's tip goes still farther back, and the Glottis closes - the constrictors of the Pharynx then drive the bolus downwards - All this is entirely involuntary - The outer layer of the coat is peritoneal, the next is muscular, and the next mucus - There are three sets of muscular fibres in the muscular layer - one longitudinal, one oblique, one circular - At the pyloric orifice of the stomach the blood vessels are arranged in circles - On the table (illus.

The inner layer of the stomach is a mucous or the muscular and the external is serous. The mucous membrane is thrown into folds the object of this is that the stomach may enlarge the two other layers will stretch but the mucous will not so it makes up for them

its extra folds. The Ruminating animals have four stomachs. The Horse is the only one lined by a mucous membrane.
In the intervals of digestion the fluids contained with in the stomach are alkaline. No more gastric juice will be provided than would be employed in dissolving the quantity of food that is now all in the Economy. Therefore all the food taken over dose above what is needed is injurious. Albumen & starch can not be absorbed. It must be changed into albumenose this differs from Albumen in not being precipitated by heat or nitric acid. Pepsine on

taking the Lecture) was the stomach of a camel - stomach of a sheep - also alcoholic preparations of the alimentary Canal of the Rock fish and those of several of the bird tribe. The sphincter at the cardiac orifice of the Stomach remains closed until a sufficient quantity of food is collected then to open it - in this way the food goes into the stomach drop by drop as it was

Fig 1.

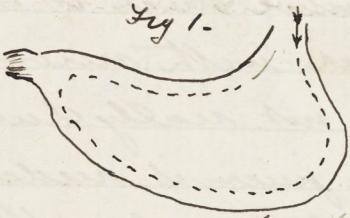


Fig 1. Shows the direction which the food takes in the stomach, due to the peristaltic action - The stomach is fully supplied with blood vessels - Gastric juice is acid in its reaction, and is viscid and sticky -

Lecture No. 15.

The greater part if not the whole

of the Gastric Juice is thrown out into the stomach at the Pyloric orifice. The acid causing the acid reaction in the Gastric Juice, is due to the presence of Lactic acid. It may sometimes be due to Hydrochloric acid. The temperature of the stomach while it is digesting is about 100°. The peristaltic movement, and the secretion of Gastric Juice is intimately connected with nervous action, but it is not really due to it. Much more gastric juice is needed to digest than the weight of the food eaten. Thus Prof. Ballin has found that if a dog eat a pound of meat at a meal, it will take 16 pounds of Gastric Juice to digest it. When albuminous food is eaten and acted

the substances made by the com
bination of the acid of the Gas
tric juice with the Albumino-
Pepsin will coagulate milk
without the presence of acid -
Digestion is a process of chem
ical solution - The introduction
of water into the stomach while
digestion is going on assists
the function - and does not
as we often suppose interfere
with it - Alcoholic Stimuli when
taken in too large quantities are
detrimental to digestion - it
also interferes with the function
when it is taken moderately -
it does by coagulating the pep
sin - The sensation of hunger
is due to the enlargement of
the blood vessels around the villi
of the stomach - These vessels

always enlarge previous to the reception of food. This they do by the influence of the great sympathetic on the muscles of. This changes in the calibre of the vessels are conveyed to the brain by the Pneumogastric. Thirst is caused by any loss in the fluids of the body. When the blood is loaded with excrementitious matter or tainous diseases are much more readily taken up, for in the condition of the blood it finds a nidus for development.

About 35 1/2 oz

upon by the acids of the stomach it is made into what is known as albuminose - very readily absorbed into the animal tissues - whereas albumen as such cannot be absorbed

Composition of Gastric Juice -

Water	975.00
Organic Matter	15.00
Lactic acid	4.78
Chloride of Sodium	1.70
" " Potassium	1.18
" " Calcium	0.20
" " Ammonium	0.65
Phosphate of Lime	1.48
" " Magnesia	0.06
" " Iron	0.05

Composition of Pepsine -

Carbon	530.00
Hydrogen	67.00

Nitrogen 178.00
Oxygen 22.00
1000.00

Lecture no 16.

The general length of time taken to dissolve food is from 3 to 5 hours. It is much shorter for some substances. It is not always the most nutritious substance that is dissolved in the shortest time. Amylaceous substances are changed, in a degree, in the stomach of man at any rate. Digestion is a chemical action. The reason why the stomach is not digested with the food contained in it, is that there is a protecting agent poured out over the organ. The stomach does contract in the act of vomiting. Vomiting differs from regurgitation

In vomiting there is a reverse peristaltic action of the stomach.
The glands in the stomach are like those of the external air.

in that the latter is not preceded by nausea. In the process of elaboration 90 per cent of fat is absorbed only one per cent of mucous tissue is absorbed.

Composition of the Pancreatic fluid of the Ass.

Water	986.40	
Solids	13.60	
Fat		0.26
Alcohol Extract		0.15
Water Extract (albuminous)		3.09
Alkalies { Chlorides, Phosphates, Sulphates }		8.90
Carbonate and Phosphate of lime and magnesia		1.20
	1000.00	13.60

Lecture no 17

Until now we have only examined digestion of albuminous substances which takes place in the stomach. amylaceous substances are sometime taken which in the stomach are changed to Grape Sugar. Valvula Conniventes serve two purposes one is to present a larger surface to the food and the other is to render more slow the passage of the food. The first Glands we meet in the duodenum are Brunner's Glands. The next that are found are the ducts of the Gland of the Pancreas and the Liver. The next Glands are those of Lieberkuhn. There are also solitary Glands and Glands of Peyer. There are also villi on the mucous mem

The Peristaltic action is due to contraction of the circular and longitudinal muscular fibres distributed on their walls. This contractility is organic and not due to nervous action. The sympathetic nerve has its influence over this action but it may go on without it, for we have this matter after dealt.

~~Acids~~ Alk

Acids stimulate the secretion of saliva which is alkaline. Alkalies stimulate the acid gastric juice. Thompson minute doses of alkalies may be a useful remedy in some cases of dyspepsia due to deficient gastric juice.

The Bile precipitates the Pepsin. It is an anti fermenting liquid " " " putrifying agent. Bile form a precipitate with the albumen as it is emit all from the stomach. it makes an insoluble solution. In this state it could not be absorbed, but the Pancreatic fluid acts upon this precipitate and make it soluble.

The Bile is probably ~~[illegible]~~ by useful as a cathartic. it bury absorber is burned up and answers as animal glue. The Pancreatic secretion seems to have an influence upon the mucous mem

brane of the small intestines. Brunner's Glands pour out a secretion which changes Starch into Grape Sugar. Bile is an alkaline fluid. The first influence of the bile is to neutralize the acidity of the albumin, thereby stopping the Gastric digestion. Out of the 7 oz of Bile that is thrown out every 24 hours only 216 gr are found in the fæces. The Bile arrests putrefaction and fermentation. Bile is a natural laxative. It has no action upon nitrogenized principles. it has no (~~principle~~) action upon albumen. The Pancreas emulsifies the oily substances, it also changes (~~Glucose~~ Starch) into Glucose or Grape sugar.

Lecture no 18.

The Bile stimulates the peristaltic movement. A large quantity of

Bile is absorbed, and little more than the coloring matter is found in the fæces — If heat be applied to Pancreatic fluid it will coagulate almost immediately — it can be made to liquify again & the fluid obtained will emulsify fat, as the fluid had at first — It is likely that the fæces receive their peculiar odor from the Glands of Lyer — The intestinal digestion is bounded at the upper part by the Pyloric orifice of the stomach, at the lower part at the Ileo Cecal valve — The large (~~digest~~) intestine does very little towards digestion & absorption does not take place here but on a very small scale: this remark above absorption is not true about the Rectum —

brane of the bowels - for when the secretions is stopped the bowels become pallid and the villi become fluxid.
Most Physiologists believe that Peyer's glands are active in the preparation of Chyle.
The Glands of Liber Kuhn also assist in giving color to the feces. While the alimentary is in the small intestine it presents an alkaline reaction - but at the Illio Coecal valve it is again acid. The act of defecation is partly voluntary and partly involuntary

The gases contained in the bowels serve to keep them patulous. Liebig supposes from some experiments of his that some of the odor of the gases is due to imperfect oxydation.

The blood vessels act as absorbents. Internal absorption is that which takes place within the peritoneum. External absorption is that which takes place upon the general lymphatic surface and the mucous membranes.

a large quantity of carbonic acid is found in the large intestine. Many of the gases found in the intestines, are eliminated from the blood vessels distributed to the intestines. Absorption is a function by which alimentary or other substance are taken up, and distributed to the blood vessel system –

Lecture no 19

About 5oz of fecal matter is thrown off daily by a healthy individual. The probable use of the sigmoid flexure of the large intestine is to prevent the too constant flow of the feces into the rectum. There are two varieties of absorption – External and internal. Lacteal absorption. This variety of absorption takes place on oleaginous substances. The lacteal vessels originate in the

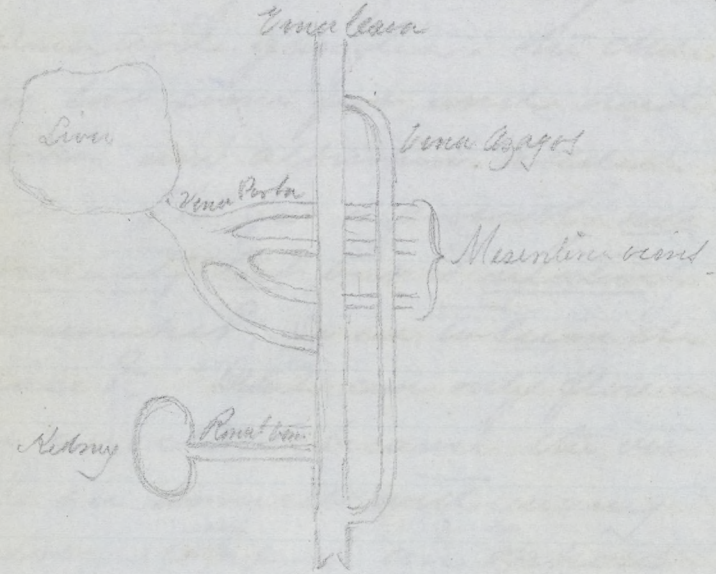
the villi of the intestine.
The vessels leaving the intestine and entering the Mesenteric ganglia are called the "apparent" canals, after they leave the Mesenteric ganglia they are called the Efferent. It is changed in its journey through the mesenteric ganglia. The chyle has lost some fat, and had fibrin and albumen added to it. The fat is probably not absolutely lost but is relatively diminished, so as to seem decreased. Chyle can only flow in one direction, because the vessels are armed with many valves stopping an opposite flow.

Lecture no 26.

If the Cyanide of Potassium be given to an animal while digesting it will

The Lacteal vessels begin in a shut sac - it may be a loop - but is seen open - The central arts of the Chylous vessels are in the outside a cellular layer in the middle a fibrous layer - and in the centre a serous layer - continuous with the lining membrane of the blood vessels - The Lacteal vessels form capillary networks within the mucous glands - The chylous alvi of Chyle depends upon the digestion or some affection of the Chylopoietic organs of food

The origin of the lymph or pus is the epithelium of the chyle vessels. These are ultimately converted into the red corpuscles of the blood



The whiteness of the chyle depends upon fatty matter suspended. In Ruminants we

not have a poisonous effect, but if the animal is not digesting it well poison almost immediately. Congestion and stagnation of mucus membranes interferes with Endosmosis greatly.

Composition of Chyle & Lymph

	Chyle	Lymph
Water	90.257	96.536
Albuminous matter (coagulable by heat)	3.516	1.200
Fibrinous matter (spontaneously coagulable)	0.370	0.120
Animal extractive matter (soluble in water and alcohol)	0.332	0.240
Animal extractive matter (soluble in water only)	1.233	1.319
Fatty matter	3.601	a trace.
Salts:- Alkaline chloride, sulphate and carbonate with traces of alkaline phosphate, oxide of Iron	0.711	0.585

If the epidermis be removed absorption will take place much more readily. Thus if morphia be put upon the bronchi a narcotic effect will be produced.

Lecture no. 26

Blood. There is no animal living without blood. The uses of the blood are. The conveyance of nutritious particles to all parts of the body. Conveyance of oxygen for the union of refuse matter. The exact composition of the blood is different in every 6 inches of an artery, for it undergoes changes in its passage. About one 8th or 9th of a mans weight is made by blood. It is said that woman's blood is lighter than mans. Pregnancy is said to dilute it. The temperature of

sometimes notice difference from this difficulty the air has in permeating the thickened bronchial mucous membranes. In these cases we can give much relief by acting upon the other excretory organ the Liver. It is computed that 28 pounds of Chyle and Lymph are thrown into the sub clavian veins daily of this 6 pounds is Chyle and the remaining 22 consists of Lymph. Lymphatic vessels are found in tissues the breaking down of which does not allow the tissue from being incubant against the nutrition. Thus we find rest in the brain because the diseased product of this disease destroys it from ever being again used in the economy.

Living Blood

Fibrine } In solution forming
Albumen } Liquor Sanguinis.
Salts }

Corpuscles } Suspended in Liq. San.

Dead Blood.

Fibrine } Forming Coagulum
Corpuscles } in a clot.

Albumen } Remaining in Solut
Salts } in forming Serum.

Approximate Analysis.

Albumen	80
Fibrin	3.
Red Corpuscles	127
Water and Salts	790
	1000.

Prof. Black discovered the fallacy of bleeding because blood than is in a healthy adult. He used a given amount of Sulph. of Alumina which will

the blood is from 101° to 102. The re-
action of the blood is alkaline.
The serum differs from the Liquor San-
guinis in being deprived of its Fibrin

Lecture no 21.

The blood disc contains two substan-
ces. to wit. an albuminous substan-
the containing bag. in this bag is
Hæmatin. The containing bag is
Globulin. of an albuminous nature
as is also Hæmatin. Iron does not
exist in the Hæmatin in the form of an
oxide, but in the metallic state. The
color of the disc does not depend up
the Iron.

Lecture no. 22.

There is probably no doubt but that
the quantity of Fibrine is increased
in Inflammation. This is a con-
sen of the tardy coagulation of the

inflammatory blood. The
fewer be the number of corpus-
cles the more decided will be
the Buffy coat and the more
marked the cup coagulum.-
Coagulation is a vital action
Is Fibrin the chief plastic element
of the Blood? No! And the ar-
guments upholding this are as
follows. First there is such a
small quantity, being only
3ij to the 18 pounds. Secondly
it is increased in all the acute
inflammatory diseases. Fi-
brin is useful in healing Gel-
atinous tissues - it is useful in
preventing hemorrhage, and
it also makes the line of de-
markation between the healthy
tissues and Gangrene - and
beside all this it prevents the

not to be found in the tissues - it will however readily mingle with the blood. he then took a certain quantity of blood from the man and found how much alumina there was in it. He then said as the quantity of the alumina found in the blood drawn is to that blood. so is the whole amount of alumina used to the whole amount of the blood. The Blood of the left side is cooler than the blood in the right side. This is easily explained in the fact that it get cooled in the lungs. The Albumen of the Blood is coagulated - it holds in solution substances which would not be in solution if it were acid or neutral. The corpuscle of the blood

Human from an adult is not so clear - there is a nucleus in it when taken from the fœtus - and the cell of the blood of our lower animals is so clear. If the corpuscles are placed in a liquid denser than its contained liquid it will allow its liquid to exosmose - and the edges of the disc will become crenated - if affinities higher put into a rarer liquid they will take it in by endosmose and assume their former shape - Corpuscles cannot be recovered if nutrition until they have become liquified for in the solid condition they cannot transude through the walls of the vessels

Analysis of Blood (Blackader)

pus from being widely dispersed

Lecture no. 23.

The coagulation of the blood is the last action of its life. Albumen of Blood coagulable in strong acids, alcohol corrosive sublimate. The walls of cells are composed of Albumen. The Fatty particles contained in the blood are changed by the food eaten

Lecture no. 24.

Respiration – By this we mean the change of venous blood into arterial by the addition of oxygen and the loss of carbonic acid. Muscular or nervous action increases the quantity of carbonic acid thrown off. In the lower animals their blood is aerated through the general integumentary surface. When

we ascend in the scale we find organs protruding from the animal, these are called Gills, and ascending higher still the organ is in the interior of the animal. these are known as lungs. In insects the air is taken into the blood by means of minute canals. The water is not decomposed in a Fish's Gill but the air that is held in suspension, as it were, in the water is used for the aeration of its blood.

Section 25 –

Aeration of the blood takes place through the integumentary surface as well as through the action of the Lungs. The use of the Trachealis muscle is to constrict the Trachea in spas

Corpuscles and Red Blood corpuscles. These blood cells are some of them produced from the primordial cells found in the mucous layer of the gastro intestinal mucosa. Others are made from the corpuscles of the lymph and chyle. The average quantity of fibrin in the blood is about 3 parts in 1000. It is insoluble in water ether and alcohol but will be dissolved in the strong caustic alkalies. The coagulation of the blood is due to the coagulating of the fibrin. When fibrin is exposed to the air it becomes oxidized. This is done in two positions. The Buffy coat of Virchow and Lebert. The Buffy coat and cup coagulum usually

denote an inflammatory state. If fibrin is not the stuff plastic constituent of the blood why does it coagulate? When we get ourselves warm by a fire in the winter and then go out into the cold - we carry the heat with us for some time. So it is with fibrin it has just left highly organized structure, every tissue and it preserves that evidence of organization by coagulating. In normal blood there is somewhat exposed to 5 or 6 parts in the whole quantity of an adult's blood. The fact of the chyle having more fibrin in it after it had passed through the mesenteric gland. Upon

modic action of that canal - such
as that of Coughing -

Lecture no. 26.

Movements of respiration - Inspiration, expiration - Quiet expiration is made mostly by the diaphragm - This muscle is mostly intermittent in respiration in youth and old age - The first rib in a female is more movable allowing what is known as superior costal respiration - This is so arranged in women in order that respiration should not be interfered with when the abdomen is so much occupied as it is by the pregnant uterus - In men there takes place what is called Inferior costal respiration - Tubercle is more likely to be deposited in that part of the lung which is the least active

thus we more frequently find Tubercle deposited at the apex of the left lung. The left arm is less used in most persons than the right. The number of respirations in a minute by a healthy well formed individual is 16. 800 cubic ft. of atmospheric air is the least that should be allowed for an individual in 24 hours —

Muscles of Respiration.

Direct Muscles.

Scalenii. Inter-costals. Levatores costarum. Serratus posticus superior. (Merely elevate the ribs.) Diaphragm.

of the arguments some times used to disprove the belief that fibrin is a retrograde product. for it is said that the composition of the clot is by their changes made more organizable but this is not due to any influence of the duration of the glands but is brought about by the complying in of the lymph which has been taken up from the system in toto. When the blood is superfibrinated it is apt to deposit upon the valves of the heart and Dr. Smith believes that this menstation of fibrin upon the valves may take place without an inflammation of the endocardium. When a heart clot is formed before death or after it will be found attached to the cordae tendineae or to the valves but its sides will be smoothed by the current of the blood. Post

membrane does are smooth and
if they be cut open they will bleed
inward to contain a light colored
clot Albumen. Air from the
that all repair and tissue is
made. It enters in the composi
tion of the walls of cells. Fi
bring days are begin to appear
in the blood of the chick until it
matches vascular movement &
is ready to come from its shell
Albumen is made from food eat
en. Albumin holds some of
the metals in solution. It pro
duces certain chemical reac
tion. The salts give to the Blood
its alkaline reaction. Some
believe that the albumen is
combined with one of the salts
Soda in the form of the Albu
minate of Soda.

Indirect Muscles.

Pectoralis (major and minor). Serratus. Anticus major. Latissimus dorsi.

Aided by

Sterno cleido mastoid. Trapezius. Rhomboidii. Levator anguli scapulæ. which fix the shoulders and help the indirect muscles to act.

Vital Capacity Table.

Height.	Vital Capacity
5 ft. 0 in to 5 ft 1 in.	174 cubic in.
5 ft. 1 in to 5 ft 2 in	182 " "
5 ft. 2 in to 5 ft. 3 in	190 " "
5 ft. 3 in to 5 ft 4 in	198 " "
5 ft 4 in to 5 ft 5 in	206 " "
5 ft. 5 in to 5 ft. 6 in	214 " "
5 ft. 6 in to 5 ft. 7 in	222 " "
5 ft 7 in to 5 ft. 8 in	230 " "
5 ft. 8 in to 5 ft. 9 in	238 " "
5 ft. 9 in to 5 ft. 10 in	246 " "
5 ft. 10 in to 5 ft 11 in	254 " "
5 ft 11 in to 6 ft. 0 in	262 " "

The vital capacity of the lungs of females is usually lower by as much as that of males. There is also only a very trifling difference between the heart's dullness in the two sexes. This is a valuable diagnostic sign in diseases of the lungs. In healthy individuals the act of inspiration is longer and more noisy than that of expiration. In this upper region it is a sign of disease, and is called superior vesicular murmur of inspiration. Rhonchi. The mucous rattle is the expiratory distribution to the bronchial tubes

Lecture no 28.

The first change which the respiratory air undergoes is

A temperature below 140° retards coagulation - an increased temperature from 100° to 120° means ex the fluidity for any albumen - but when the heat is raised to that point where albumen coagulates it prevents the blood from forming a clot - Many point are coagulated in the coagulation of the blood in. The explanation most commonly received is the escape of ammonia from the blood which formerly held in solution in the fibrin - But coagulation takes place with the ammonia - and upon a theory the blood across the middle of a blood vessel - Coagulation is a vital action - The coagulation is the best evidence of its life - fibrin gives up its life in the act of

coagulation - "The blood is a growing organ" it is formative and shows this in its ability of development - growth and assimilation - it shows its assimilative power from the fact that "an scar" made upon the blood is as lasting as scars upon the integument - manifested by the form of small pox or Syphilis it lasts and all the new blood that is formed is assimilated to the constitution - Blood when allowed to dry on a microscopic glass forms by its own solution, with gum shell into crystals - that are gum of Haematoidin -

Respiration - This is another function - The Carbonic acid dismantles cells from

a change of temperature. It can in
crease in its quantity by moisture,
a change of specific gravity or
quantity. Small quantities may
be unknown to the air. The
mercury can also be used for
other purposes and secures the
tonic acid. From 1 to 2
sold Carbon dioxide of air
the course of 24 hours in the
subsidence when there is a certain
acid called "mucic" of 1 lb
mercury and. This may be shown
by calling a fresh lung and fast
by a piece of Sex paper on the
surface. The presence of Hydrogen
will turn it red. The change
in the color of the blood gives
acid, to various, is believed to
be due to a change in shape of the
corpuscles which by absorb light
and not due to any chemical

change in the corpuscles themselves.

Coloring Matter of the Blood.

$C^{44} H^{22} N^{3} O^{6} Fe^{1}$. —

After passing Chlorine through the corpuscles we have:

$C^{44} H^{22} N^{3} O^{6} + 6 (ClO^{3})$ —

After digesting them with strong Sulphuric Acid, we have:

$C^{44} H^{22} N^{3} O^{6}$ and no Iron:

but the Color remains.

If Iron existed as a sesquioxide of hæmatine, weak acid ought to dissolve it out, and the residual Iron-free matter should be:

$C^{44} H^{22} N^{3} O^{4\frac{1}{2}}$ instead of

$C^{44} H^{22} N^{3} O^{6}$ really left.

Lecture No 29.

If the air be prevented from entering the lungs venous blood

3 different ways one muscular
waste. another the death of tissue
and lastly the result of combus
tion. The integ=
umentary sur
face of many
of the animals acts as the lungs
do in the higher animals.

The Trachiales mus
cle is situated be
tween the cartilag
inous rings of the
Trachea and serves
to lessen the calibre of the chan
nel. These rings are insufficient

pitiably. They also exist in the larger of the Bronchi. each ring is insufficient sometimes in their length. There are bronchial muscular fibres running around the Bronchi. They regulate the calibre of the tubes so as to meet the wants of the system. Spasm of these fibres constitutes Asthma. and Belladonna Drumonium and Ether act in this disease by relaxing the muscular fibre. In the very minute bronchi there are no rings no muscular fibre and no mucous membrane, It is computed that there are 1400 sq. ft of surface upon which the blood may become aerated in the human lung. Atelectasis the opposite to this condition which

will soon be stopped in the
artery - and apnoea will bring
an end to life. Dilatation will
be found at the first stage, and
a lividity will be seen. The se-
cond stage is one of unmistakably
convulsive character. The temperature of the animal
at this time when the air is ex-
cluded varies with the length of
time in which the animal can
live without air. In an ani-
mal which died of apnoea
the left side of the heart and
the arteries of the pulmonary system will
be found almost empty, while
the right side of the heart will
be unchanged with blood. The
unconsciousness in apnoea is
due to the deficiency supply of
blood and of the brain, which

abstraction by the quantity of carbonic acid in the circulation. Treatment of Apnoea. Place the patient prone on his face. hold out the tongue. he is then rolled a little more than on his side. The extremities are to be rubbed upwards. This is Dr. Marshall Hall's method.

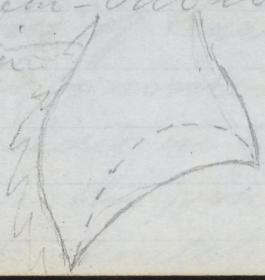
Then dash cold water against the face and chest. Give a mixture containing 16 or 20 drops of liquor ammonia fortis.

Lecture no. 30.

Average of Heart's action.

	Beats per minute.
In the foetus in utero.	140 to 150
Newly born infant	130 " 140
During the first year.	115 " 130
" " 2nd "	100 " 115
" " 3rd "	95 " 105
From the 7th to the 14th	80 " 90
" " 14 to the 21. "	75 " 85
" " 21 to the 60 "	70 " 75
Old age.	75 " 80

new born infants sometimes present - when they are unable to perfectly expand the air vessels. Cyanosis is due to this condition. If the lungs of a child who has not breathed be examined they will be found to be far back against the spine - small and liver colored - when the child has breathed the lungs will almost fill up the thorax and will be light red - The lung after birth is heavier than it was before but nevertheless the lungs before birth will not float upon water after birth it will - The lung then after Birth is actually heavier than that before - but it is specifically lighter



Respiration is an act which is part by voluntary and partly involuntary. The part of the nervous system which presides over Respiration is the Medulla Oblongata. The Pneumogastric is the chief respiratory nerve. It starts between the Olivary and the Restiform bodies. The nerves of the general tegumentary surface are sensitive in reference to Respiration, as also the Great Sympathetic. The Motor nerves of Respiration are the Phrenic, Intercostal, and the Inferior. The Superior Laryngeal nerve is distributed to the superior part of the Larynx and Glottis. Should any thing irritate these parts contraction is caused by reflex action. Spasmodic Croup often takes place as the consequence of crude food in the

At each Systole about ℥iij of blood are thrown out of the heart. Now the question arises what causes the heart to act? It is known that its action does not depend upon the presence of blood in it, nor is it due solely to the action or influence of the nervous ganglia therein found. Dr. Carpenter holds the following view, viz - "that the hearts action depends upon an excess of mobility in the muscular fibrils depending upon previous acts of nutrition. Prof. Smith disagrees with Dr. Carpenter, and thinks that the hearts action is due to the stimulation of carbonic acid, for it must be remembered that this acid resides in the arterial as well as the venous blood, and it also should be remem

bered that an excess of Carbonic acid, only, is sedative - just as opium or alcoholic stimuli in large doses are powerfully sedative, while in a limited quantity they are as potent as stimulants. For Syncope then, the fingers may be applied to the nose and thus prevent the entrance of a due amount of Atmospheric air - the Carbonic acid will accumulate in the blood and stimulate the heart to action -

Lecture No 31 -

Sounds of the Heart and attendant Phenomena.

184.

Causes	Phenomena
Rush of blood through auriculo-vent. orifices: Diastolic: Rush of blood through the orifice of the Aorta and Pulmonary arteries. Sound of Muscular contraction. Collision of blood particles —	Auricles contracting ventricles dilating and contracting - Pulse and Impulse - Auricle dilating

Stomach - here it acts as an irritant and thus causes reflex act in which is reflected upon the Larynx and contraction takes place.

Circulation - The Heart of the fish is a respiratory heart. it propels the blood only to the lungs. The Heart of reptiles in turtles for instance - propels mixed arterial and venous blood both to the lungs and to the system at large. This supply of blood fully answers to all the wants of animals as sluggish as reptiles.

	Base	Middle	Apex
Left ventricle	4 1/2 lines	5 7/16 lines	3 7/16 lines
Right ventricle	1 5/16 lines	1 3/16 lines	1 1/32 lines

There are many things which influence the heart's action. The time of day influences the number of beats. There are fewer in the early morning than in the night time. Food can change it. It beats some 15 times more in one minute ~~[illegible]~~ when the individual is lying than when he is lying down.

2nd { Shutting down of the Sigmoid or Semilunar valves } { Ventricle dilating, auricle dilating }

Interval of Repose -
auricle distended - Ventricle dilating -

In answering the question why the heart is the only organ which answers to the stimulation of Carbonic acid we must consider three things. First - The amount of stimulation - Second - The amount of Irritability. Third - The amount of resistance - It is the Diastole and not the Systole which occasions the "Impulse" of the heart -

Lecture no 32 -

Coats of the Arteries beginning from the inside - { Serous, Muscular, Elastic, Connective. }

The Elastic coat assists in the shutting of the valves of the Aorta and Pulmonary arteries: it also

keeps up a constant pressure on the blood contained in the Aorta and in addition to all this the elasticity of the arteries allows free movement of the body.
The muscular coat is under the influence of the Great Sympathetic.

The Pulse.

Indicates	By	It is called
1st. The strength of the contraction of the Heart.	Strength.	Strong
	Weakness.	Weak
2nd. The quantity of blood thrown out at each contraction.	Fullness	Full
	Smallness	Small
3rd. The number of contractions.	Frequency	Frequent
	Slowness.	Slow
4th. The regularity of its action, as to strength, quantity or frequency	Regularity	Regular
	Irregularity	Irregular
	Intermission	Intermittent
5th. The degree of the tonicity of the arteries	Hardness	Hard
	Softness.	Soft
	Redoubling	Redoubling
	Trembling	Trembling
6th. The irritability of the nervous system.	Quickness	Quick
	Jerking	Jerking

Lecture No 33.

In a bracelite pulse the first impulse is made by the blood forced through the arteries by the action of the Heart. The sec.

and impulse is caused by the sluggish elongation of the walls of the artery, and also an enlargement in its diameter. The rate of the pulse is increased by the taking of food - as also by exercise, position, thus the pulse will be greater in the upright position or in the sitting, than in the recumbent - This is what is called the "Differential Pulse." This difference is due to the muscular action needed in keeping the person in the particular positions. Capillary System - Each organ has a capillary system peculiar to itself - There are 4 Capillary systems. One between the systemic arteries and veins called the System in system - another between the Pulmonary arteries and veins, called the Pulmon

ic System" - another in the liver called the "Portal system," and still another in the Kidneys called the "Renal system"

Lecture No 34.

The volume of the venous system is 2 or 3 times greater than that of the arterial. At a strong inspiration the blood rushes into the lungs with greater force than usual, It does this in order to make up for the vacüm made in the lungs by the dilatation of the walls of the Thorax -

The forces which move blood in veins are 1st. Vis a tergo (Heart and Capillaries)

2nd. Vis a fronte (Suction of Heart -)

3rd. Inspiration of venous blood

4th. Muscular movements -

Muscular force when the mus-

cle is idle is alkaline, but after the muscle has been thrown into violent action this juice becomes acid — The blood has the power of assimilation —

Lecture No 35 —

Secretion — means strictly separation —

Composition of Sebaceous Matter —

Animal substance	358.00
Fatty matter —	368.00
Phosphate of Lime —	200.00
Carbonate of Lime —	21.00
Chloride of Sodium } Acetate of Soda }	37.00
Carbonate of Magnesia	16.00
	1000.00

Fluid of Ascites —

Water	952.30
Albumen	28.80
Urea	4.20
Chloride of Sodium —	8.10

Carbonate of Soda	2.10
Phosphate & traces of Sulpho Soda	.60
A Viscid Substance	8.90
	1000.00

Synovial Fluid.

Water	948.00
Mucus & epithelium	5.00
Fat	0.70
Albumen & Extractive	35.00
Salts	9.00
Loss.	2.30

Lecture no 36.

A Follicle is in fact an inversion of a mucous membrane. Sebaceous follicles secrete an unctuous matter. They are particularly well developed in the parts where hair grows. They are found most abundantly in those inhabiting hot climates. The necks of these follicles some

The perspiration is usually acid - but it sometimes it becomes neutral and even alkaline - As the function of the skin is supplemental to that of the Kidneys it is necessary to keep the skin in a good condition in all diseases of the Kidneys -

times become stopped up giving rise to the disease called Acne Punctata. It is supposed that the matter found secreted in the ear is useful as a sort of bird lime - to ensnare any insect or animalcule that may endeavor to intrude his way into the ear. It is calculated that the perspiratory secretion throughout of every day, weighs some $2\frac{1}{2}$ or 3 pounds.

Composition of Pulmonary Mucus.

Water	955.52
Animal matter	33.57
Fat	2.89
Chloride of Sodium	5.83
Phosphate of Soda & Potassa	1.05
Sulphates	.65
Carbonates	.49
	1000.00

Composition of the Perspiration.

Water	995.
Animal matter with Lime	.10
Sulphates & Substances soluble in water	1.05
Chlorides of Sodium and Potassium & spirit Ex.	2.40
Acetic acid, acetates, lactates & alcoholic EXH.	1.45
	1000.00

Lecture No 37 –

Lachrymal Gland – Is a granular gland – This Gland is situated over the eye – The liquid is composed almost entirely of water – chloride of Sodium is also a constituent – The tears are always being formed – The reason that they are drawn into the ductus ad nasum may be ascribed to a sort of Syphonic action – The Parotid is a granular Gland: the secretion of this gland is thin &

There is a doubling of membrane at the orifice of the ductus ad nasum which acts as a valve which closes during the act of expiration.

There are cases upon record in which there have been 3 and even 4 mammary glands - The supernumerary ones are situated in the groins - Milk is at Rabin - A healthy woman secretes from 1 to 2 qts. of milk in the course of a day -

watery - while that of the Sub Maxillary is thick and viscid. The Mammary Glands. These are granular or racemose glands. There are usually some 15 milk tubes opening into the nipple. The ends of the tubes are dilated. These tubes do not anastamose. Then for any one of them may be diseased while the other ones remain healthy. The milk first secreted should be drawn off in order to prevent distension and inflammation of the Gland.

Constitution of Colostrum & Milk.

	Colostrum	Milk
Water	828.00	887.60
Fat	50.00	25.30
Casein	40.00	34.30
Sugar of Milk	70.00	48.20
Ash	3.10	2.30
Loss	8.70	2.30

Milk of Women of different Temperaments.

	The Blonde	The Brunette.
Water	892.00	853.30
Butter	35.50	54.80
Caseine	10.00	16.20
Sugar of Milk	58.50	71.20
Salts.	4.00	4.50
	1000.00	1000.00

If we have to use "artificial human milk - we take 2 parts of water to 1 of unskimmed milk - a little sugar must be added - to this put a little lime water and a pinch of common salt

Milk -

	Cow	Goat	Sheep	Ass	Man
Water	861.0	868.0	856.2	907.0	896.3
Butter	38.0	32.2	42.0	12.10	traces
Caseine	64.0	40.2	45.0	16.74	16.2
Sugar of milk and Ex. matters	29.0	52.8	50.0	62.30	87.5
Fixed Salts.	6.1	5.8	6.8		

There is no secretion of the body which is more under the influence of the nervous system than Milk - not even that of the liver. Passion influences the quantity and quality of this secretion - therefore in the selection of a wet nurse or chemotle tattler with an equable temper -

There is no gland more constantly found in anomalous than the liver. It is properly a Tubular Gland. The specific gravity of Bile is 1018. It acts on fat in stomachal digestion. The Saure Cholic acid and Glycocholic acids are thrown out with the Bile but they are not excrementitious

ions - for they are not formed
low down in the intestines -
they are reabsorbed and
become again nourishment
to ulterior changes - The
Bilverdine or colouring matter
of the Bile is gotten from the
blood - Pettenkofer's test
is as follows - Take some
Bile - put it into a little water
add one drop of simple syrup -
and then add Sulphuric
acid drop by drop until
a fine red hue be observed
in the liquid - If this
then be left alone the mixture
will become a beautiful Lake
purple - This test shows the
presence of the Glyco cholic
and Tauro cholic acids -
Trommer's Test - (for Sugar)

Lecture no 38

Composition of the Bile

Water	880.00
Glyko-cholate of Soda Tauro-cholate of Soda	90.00
Biliverdine Fats Oleates, Margarates & Stearates of Soda & Potassa Cholesterine	13.42
Chloride of Sodium " " Lime " " Magnesia Carbonates of Soda & Potassa	15.24
Mucus of the Gall Bladder	1.34
	1000.00

Cases have been known in which milk has been thrown off by other emunctories - such as in the saliva - A healthy woman is able to secrete from Qt. 1/2 to ii every 24 hours. The liver is the largest gland of the

body, and weighs from 3 to 5 pounds. The reaction of Bile is neutral. Two pounds & a half of Bile are secreted every 24 hours. The Cholesterine is probably derived from the disintegration of nerve tissue, this is held in solution in the liver by the Taurocholate acid. & if from any cause there is a deficiency of this acid a precipitate will be made — this precipitate will form Gall Stone. Bile arrests fermentation. it also acts as a natural Cathartic. Bile is an excrementitious fluid much of it undergoing change in the intestines is reabsorbed, and is used for calorific purposes. The Liver also has for its purpose the act of

Take the suspected liquid add to it a solution of the Sulphate of Copper - and put into the same Liquor Potassa - when this is boiled the Red sub oxide of Copper is produced proving the presence of Sugar - If the Medulla oblongata at the position in which the Pneumo gastric nerve arises - be irritated - sugar will appear in the urine - Both Diabetes Mellitus may have its origin in a diseased condition of within the Medulla oblongata the - Respiratory System or the Liver - or it may be due to a diseased State of all of them.

assimilation. The Glucose or Grape sugar formed in the Liver has first to be made into Dextrine.

Conclusions.

1st. Sugar is a normal product in man

2nd. That this principle is secreted by the Liver & that it is a normal function of that organ.

3rd. That the source of its supply is from the nitrogenized elements of the system.

4th. That the food furnishes it also to the system.

5th. That in the glycogenic function there is a sympathy of relation between the liver, the lungs and the cerebral centres.

6th. That in the disease called Diabetes Mellitus the equilibrium of the production & destruction is

destroyed. & that any one of these structures may be at fault: & that it is to one or more of them that our remedies are to be applied.

7th. That small quantities of vegetable food may be allowed to our patients.

Lecture no 39.

Composition of Urine.

Water	938.00
Urea	30.00
Creatine	1.25
Creatinine	1.50
Urate of Soda, Potassa, Ammonia	1.80
Colouring matter & Mucus	.30
Phosphate of Soda, Phosphate of Soda, " " " Potassa	

The specific gravity of the urine in the Summer time is about 1030. Its specific gravity has a diurnal variation — It is lower in the morning than it is in the afternoon of the day — When Urea is retained in the blood there is Headache — Coma — and Convulsions with disordered digestion.

Phosphate of Magnesia " " Lime	12.45
Chloride of Sodium & Potassium	7.80
Sulphates of Soda & Potassa	6.96
	1000.00

The Blood, detained by the very tortuosity of the vessels in the Corpora Malpighiana, loses much of its water. The specific gravity of the urine is from 1015 to 1020. The reaction of the urine when first passed is distinctly acid it afterwards is alkaline. A healthy man will pass some 35 ℥ of urine in 24 hours. The urea is derived from the nitrogenized tissues of the body, and also from the extra quantity of nitrogenized food taken. another source is from the "wear and tear" of the nervous tissues. Urea in the blood does not have to become Carbon

ate of Ammonia in order to act in its poisonous way. for its acts of itself unchanged.

Lecture no 40

Amount of Urea excreted in 24 hours.

	Minimum	Mean	Maximum.
By men	357.51	433.13	510.36
" women	153.25	295.15	437.06
" old men	61.08	125.22	295.15
" children	51.28	69.55	81.83.

Urea is but the more highly oxidized Uric Acid. In every living organism whether vegetable or animal, there is a power of resisting high temperatures. The temperature of the body of a man is from 98° to 100° in a child it is from 1° to 2° higher. The temperature of the body is a de=

The amount of urea thrown
off has a diurnal variation —
It is greatest between 6 & 10 P.M.
least after the breakfast — &
medium during the morning —
Mental as well as muscular
effort increases the quantity
of urea excreted — Pure uric
acid is almost entirely insoluble
Creatin and Creatinin
found in the muscles, blood
and urine — Creatinin is
produced by the hyperoxidation
of Creatine — The acid
reaction of the urine is not due
to the presence of any free acid
but is in consequence of the
Bi Phosphate of Soda — When
Pneumonia is on the decline
the Chlorides are found to
be absent — when it is being

resolved the Chlorides are discovered to be present. The fact of their presence may be ascertained by the addition of a solution of the Nitrate of Silver. If the Chlorides are present the Chloride of Silver (a dense white precipitate) will be thrown down. In patients suffering from the one deathness the alkaline treatment should be employed. In the Phosphatic Diathesis acid remedies should be given. The following table shows the condition of the urine after the accident of Chassaing had been given.

	Before meal	After meal
Quantity of Urine	℥ XVI	℥ XIV
Specific Gravity	1.025	1.017
Total Solid	416 grs.	782

gree or two lower in sleep-
Food & exercise will Elevate the
temperature of the body - Man
can live, and enjoy life be-
tween the extremes of 200° of
temperature - Artificial heat
must be supplied to those
suffering from the exhausting
diseases, and also alcohol must
be given which acts as a
fuel in the economy - The
nervous system has an influ-
ence over the Calorification of
the body, but the animal heat
generated is not wholly due
to nerve action -

Lecture no 41 -

Animal Functions -

Sensation
Muscular motion } voluntary / involuntary
Mental & Moral
manifestations

The outer membrane of a primitive nerve fibril is called "Tubular membrane" – next inside of this is a tube named the "White substance of Schwann", and inside of this there is what is called the "Axis Cylinder" –

Analysis of Nerve –

	Infants	Youth	Adults	Old men	Idiots
Albumen	7.00 –	10.20 –	9.40 –	8.65 –	8.40
Cerebral fat	3.45 –	5.30 –	6.10 –	4.32 –	5.00
Phosphorus	0.80 –	1.65 –	1.80 –	1.00 –	0.85
Osmazome & salts	5.96 –	8.59 –	10.19 –	12.18 –	14.82
Water	82.79 –	74.26 –	72.51 –	73.85 –	70.93
	100.00	100.00	100.00	100.00	100.00 –

Organic or Vegetative functions –

Generation –

Digestion –

Absorption –

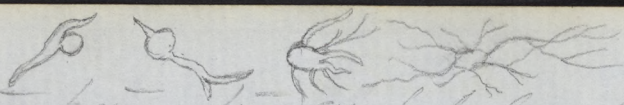
Respiration –

Circulation –

Nutrition –

Uric acid	2.6 grs.	3.5
Urea	130.5 "	262.4
Other organic comp.	189.3 "	295.5
Soluble salts	72.0 "	248.4
Insoluble salts	21.6 "	32.2

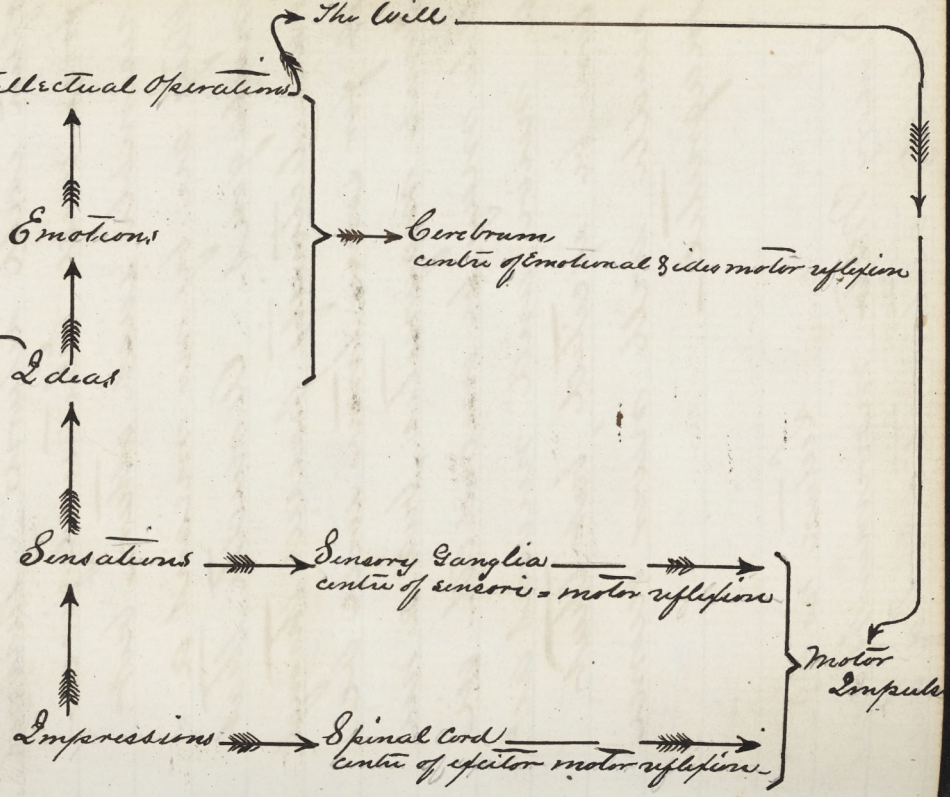
Nerves which carry sensation from without to within are called Afferent. Those which carry mandates for motion from within to without are called Efferent. Cortical and Medullary are terms not applicable to the afferent kinds of nerve substance. Vesicular and Tubular are the proper terms. Vesicular appertaining to the cortical and Tubular to the Medullary. Vesicular or Ganglionic cells are supplied with appendages. Some have one and are called unipolar



Those having two are bipolar. Those having many are called multipolar. These prolongations serve to connect the ganglion directly with the tubular portion. By observing the distribution of a nerve we may often decide whether it is afferent or efferent.
Ganglionic cells have the power of receiving and storing up impressions. This faculty is perpetuated by the perpetuation of formation for each new cell having imparted upon it all of the character & tactics of the old cell. These cells have the power of originating nervous power. Afferent nerves carrying sensations from without in and in the

Section -
Calorification -

Lecture no 4 2 -



If the nerve be divided and the cut ends be allowed to remain on each other the separation of the nerve, and the function of it may and often will return - Nervous force and Electrical force resemble each other - but they are by no means a=nalagous - A needle that has electricity passed through it for some time will be=come magnetic, but a nee=dle may be imbedded in a nerve, and nervous act=ion be excited, but that needle will never become magnetic -

Lecture no 43 -

Sensory Motor movements are wholly automatic and are

sensory ganglia they do not go to the posterior ganglia but arising upon a similar surface terminate in the sensory ganglia. We may divide the functions of the nervous system physiologically as follows. Excito motory. Sensory motory. Pneumogastric. The first two are reflex in their nature. There is much blood circulating in the brain than in any other organ. Mayer computes that 1/5 of the entire quantity of the blood circulates within the Cranium. The fact that the cortical or vesicular substance is the seat of intelligence, reason and will is proven by comparative anatomy, experiments and path-

ology are alterations. Among the fish tribe the Shark is the most intelligent - and it is from the greater relative quantity of nervous matter. In the Bird tribe the Parrot and other talking birds have more nervous substance than those which are made to receive any education. If the grey substance be sliced off in part in one of the lower animals, it will be noticed that its intelligence and reason will be gone - though its sensibility will remain. It can walk but if a pistol be fired off near to it - its eyes will open and it will give evidence of having heard it - though its mind can

not guided by reason. Thus the Bee builds its hive in the proper manner by mere instinct. the young bee builds a hive with the same skill that the old one does. There is no progression. Thus proving that its actions are merely automatic and are unconnected with reason.
The brain of an adult weighs 50 ounces. The brain of a female is a little smaller & less weighty than that of a man's. It is poetically said that "woman has one less cell in her brain — but it is compensated for by an additional fibre in her heart." The relation in weight of an adult brain to an adult body is as 1 to 36. The quantity

of the blood in the Brain is variable, although it has been argued that as the skull is an air tight box the pressure of the air would always exactly regulate the quantity of blood allowed in this cavity. Coincidently with intelligence we find the peripheral ganglia developed.

Lecture no 44.

The reason that we can carry on two chains of thought at the same time, is because the two hemispheres act independently. Thus one can perform on the piano and carry on a conversation at the same time: or to give

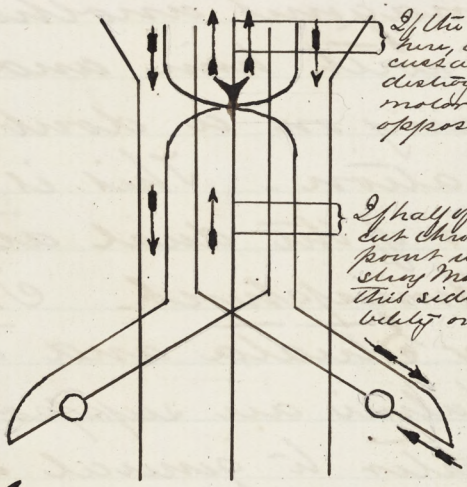
no longer link along in with
noise - and it thus fan does not
move off -
The Corpus Striatum provides
our motion - and the Thalmi
Nervi Opticum provide our
Sensibility - The diseases of
Which are Brondly of Medical

The Pneumogastric nerve has its origin in the Pistiform body

another illustration. a person often reads with one hemisphere, as it were, while the other one is engaged in different thoughts, and not a single idea is received from the reading. In delirium a patient often imagines another person with him, and he will carry on a double conversation. This is on account of the dual action of the Hemispheres. The Corpora Striata and the Optic Thalmi are supposed to minister to general sensibility. The fact that paralysis is found on the opposite side of the body to which the injury of the brain is seen, is explained

by the decussation of the fibres of the Medulla Oblongata. The Medulla oblongata presides over the functions of Respiration & deglutition.

Lecture no 45.



The Cerebellum has for its function the coordinating of muscular movement. This is learned by experiment & by attention to comparative

Wherever there is a Peripheral gen
glen superposed there is genius
is to a Rostellum. The Shaft
of all design has the greater gen
eral of more minds and on

we find a larger relative brain than any other of the first tribe.
In opposition to the supposition that the Cerebellum is the seat of Sexual desires. The cod in whom there is a large Cerebellum has no connection with the females and therefore can have any sexual feeling - it merely passes the sperm over the female eggs. The Kangaroo and Monkey remarkable for their vile desires have smaller Cerebella. The Gold my has a smaller Cerebellum than the Stud.
The Grey or Vascular matter in the middle of the Medulla Spinalis conveys impressions to the Brain and not

physcology - Thus we see that such animals as bears, ourang and monkey each one of which is able to stand and walk on the hindermost legs, have a more highly developed Cerebellum than those below them. If the Cerebellum be exposed on an animal and be pared off by degrees, the animal will lose slowly the ability to stand and it will at length fall, entirely unable to recover the upright position -

Lecture no 46

If the posterior column of the Medulla spinalis be divided through, in one of the lower animals, it will immediately go into an Epileptic form of Convulsion. If the pos-

terior column be divided the animal will not lose all its sensibility. Thereby proving that there is some other way of conveying impressions to the Brain than by these posterior columns. This other way is the Grey matter of the Spinal cord. In post mortem examinations of persons who have suffered with Progressive Ataxia it has been found that the Posterior Column was atrophied. Persons suffering from this disease do not lack muscular force or movement but there is a total lack of coordinating influence over these movements. If the Medulla Spinalis be

the posterior roots. The sensory fibres decussate in every part of the Medulla Spinalis. The motor fibres decussate only in the Medulla Oblongata. When a section of a lateral half of the Spinal cord is made motion will be destroyed in the same side but the sensibility of the same side will be increased. This is caused by the division of some of those nerves which preside over the calibre of the vessels. With this there comes a greater supply of blood and therefore increased Gmelin and Sinelli etc. When Magandie had divided the anterior roots and irritated the distal extremity the animal gave evidence of pain. He called this recurrent sensibility

ity and considered it as an evidence that the author was contained some motor fibres. But it can be explained in a more probable manner. When he irritates the distal end he excites the irritability of the nerve which brought about a galvanic condition of the muscles to which that nerve is distributed. This causes spasm, which is carried to the brain through the posterior roots - and therefore it was that Magendie found that when he divided the posterior roots at the same time no evidence of pain was given. The posterior columns have for their junction with the Cerebellum & the co

divided any where in its length and the lower extremities be irritated or tickled the limb will contract. If the person be asked to move the limb he will be found entirely unable to do so. This is proof that the Spinal nerve is an independent nervous center.

Lecture no. 4th

Reflex Paraplegia is due to a contraction of the blood vessels of the Cerebellum brought about by reflex action from a remote organ. This lack of blood flowing to the part, causes loss of the proper nutrition of the Cerebellum, thereby its function is interfered with.

The nerves of the Great Sympa

Thetic System differ from other nerves in constitution, size, color, and consistance. The consistance of its fibrils is soft: the color is darker, somewhat grayish: the size is smaller: and lastly they contain no white substance of Schwann. This system has numerous functions to perform. among others it prevents consciousness of the movements and actions of the different organs of the economy. It also causes a peculiar rythmical and sluggish movement in the parts to which it is distributed. In addition to all this it regulates the calibre of the blood vessels, and thus increases or

ordinary of muscular move
ment. Strychnia produces
a dilatation of the blood vessels
of the cord. So in cases of penal
ysis caused by a too great
quantity of blood in the cord
this is the most injurious sim
ilar that can be given. Re
flex action influences secretion
and nutrition as well as motion.
An instance of its influence may
be seen over secretion in the
fact that when any thing comes
in contact with the tongue
saliva is copiously secreted
and poured out. A strong
instance of reflex action is that
in a wet that is an extra layer
of bone deposited within a wounded
skull during such proceeding.
This is not a very rare case

ulner. Reflex action depends upon the degree of irritation in the part in which it takes place. The more blood there be in the Spinal cord the more active will be Reflex action. The more grey or vascular matter there be in any ner=vous system the more Reflex act=ion can it excite.

diminishes nutrition. It is concerned in excite secretory action. It also prevents e-motions from acting as stimulants to the different organs. But emotions may be so violent as to surcharge the great sympathetic, and then any organ, such as the heart will be excited to increased action by the inordinate emotion.

Lecture No 48.

Sensation may be defined by saying that it is a consciousness of impression. It is not the change on the peripheral part of the body of which the mind becomes cognisant - but the change made in the Brain itself

No nerve of special sensibility can ever take upon itself, the function of any other. Subjective or Internal sensations are such as are made on a nerve in its course, or at the sensory centrum. These sensations are always referred to the peripheral termination of the nerve. Increased vascularity augments sensation. The reverse is also true. Vascularity is indeed essential to sensation. The continuity of the nerve is also essential. And lastly a healthy state of the part is needful. Prof. Smith thinks that in addition to the five sen=

Congestion or effusion into the brain often cause subjective sensations - thus when the effusion or congestion with flushes of light are seen by the eyes.

ses we should enumerate
Muscular sense. How
does the man who is blind-
folded resume the erect po-
sition, if a very strong wind
be allowed to blow on him,
he will lean against the
wind in order that he
may keep his feet. This is
done at the instigation
of Muscular Sense.
Touch. A nerve from the
posterior column of the
Spinal cord terminates
in each papilla. Dr.
Smith thinks that it ter-
minates in a collection of
grey matter, which receives
the sensation and con-
veys it to the axis cylinder.
The nerves distributed in
the skins of whales are

extremely sensitive - so much so that they can tell the approach of the whaler by the peculiar sensation the water has on them -

Relative sensibility of different parts of the body -

Point of Tongue	½ line
Red surface of lips	2 lines
Palmar surface of 2nd phalanx	2 "
Dorsal " " " 3rd " "	3 "
Dorsum and edge of Tongue	4 "
Palm of Hand	5 "
Hard palate	6 "
Dorsum of Hand	8 "
Lower part of forehead	10 "
Skin over patella	16 "
" " Sacrum	18 "
" " Spine	30 "
Middle of arm	30 "
" " thigh	30 "

Lecture no 49

It has been affirmed that there are two distinct sits of nerves one capable of receiving the impression of pain and the other having the sense of touch. This is not so - but these nerves only differ in their endowments The sense of touch is probably the most universal one - being found in almost every animal - It is sometimes called the "primary sense" - Sense of Taste -

A.A.A.A. Filiform papilla

B. Fungiform " "

If we cut the Gloss=pharyngeal nerve we destroy the sense of taste in the back part of the tongue and Pharynx - If

the fifth pair be cut the sense of taste will be destroyed at the sides and tip of the tongue — These two nerves are not however only nerves possessing the sense of taste, but they minister to general sensibility. The substance to be tasted must be soluble in the fluids of the mouth. The sense of taste although not an intellectual one, is capable of cultivation. There can be subjective sensation connected with the sense of taste, as well as with the sense of touch.

Sense of Smell, or Olfaction

Bennet has reported a case of an individual who had no trace of the Olfactory gan-

glia, but in whom the sense of olfaction was unimpaired. This would go to prove that the fifth pair, or that part of the fifth pair which is distributed to the nose is the special nerve of olfaction. The sense of smell is capable of education.

Lecture no 50.

Sense of hearing. Contained in the membraneous labyrinth is a fluid called Endolympt between the bony labyrinth and the membraneous there is a fluid called the Peri-lympt. The Portio mollis of the seventh pair has been traced as far back as to the Fourth ventricle where it meets grey matter. This nerve

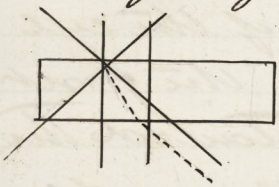
is distributed in the labyrinth the semicircular canals and the cochlea. No membrane or string will ever reciprocate a note which is lower than its own fundamental note. The use of the semicircular canals has been pointed out by Dr. Jackson. it is as follows. The vibrations after having made their impressions on the auditory nerve, enter at both orifices of each of these canals, and travelling around, the vibrations clash in the middle, and like two waves meeting. the one destroys the other. There fore we have not a continual roar or ring in

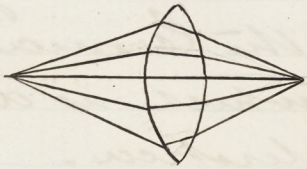
The rays of light passing into the eye go directly through the Retina which is life is perfectly transparent. muling the Choroid coat it is changed into heat. This impresses Jacob's membrane and the impression is taken up by the nerve filaments and conveyed to the optic nerve by which means sensibility is made

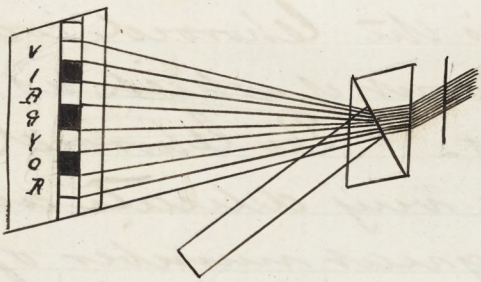
our ears.

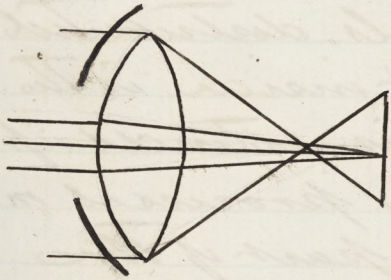
Lecture no 51.

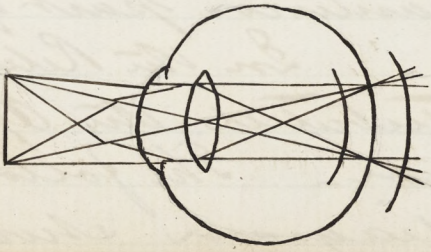
Sense of Sight.











The sense of sight in man implies more than the ability to discern light. It observes shape and color. The outer layer of the eye is the Cornea, in the front of which is dovetailed the Sclerotica. Next inside of this is the Choroid coat in the front of which is the Iris. The Choroid coat is very delicate and has a great number of blood vessels distributed in it. Next inside is the Retina which extends up to the ciliary processes in the anterior part of the eye. In the Retina is distributed the Optic nerve. The following is a diagram showing the

different layers of the Retina. Next inside is the Hyaloid membrane, which contains the Vitreous humor. In the front of the Vitreous Humor is the Crystalline lense. Contained in the anterior and posterior chambers of the eye, is the Aqueous Humor. The optic nerve distributed to the Retina lacks the white substance of Schwan. The Choroid coat absorbs the rays of light after they have impressed the optic nerve.

Lecture no 52.

There are six muscles

connected with the eye-
four of which are straight
and arise from around
the optic foramen. The
adaptation of the differ-
ent parts of the eye to
various distances is brought
about by the contraction
of the ciliary muscle.

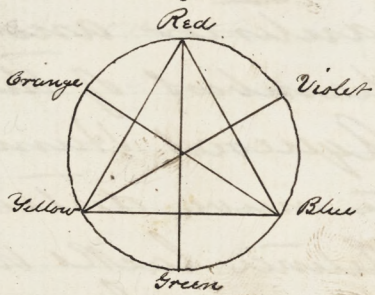


Diagram showing the com-
plemental colors.

Lecture no 53.

On "Life and Death."

Feb. 26th. 1864.

At the apices of the triangle are arranged the three primary colors and between them are put the colors which their combination will make.